

# The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LII  
No. 1337

SATURDAY, FEBRUARY 10, 1945  
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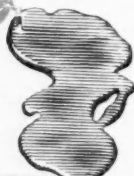
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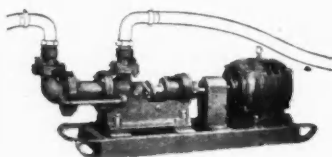
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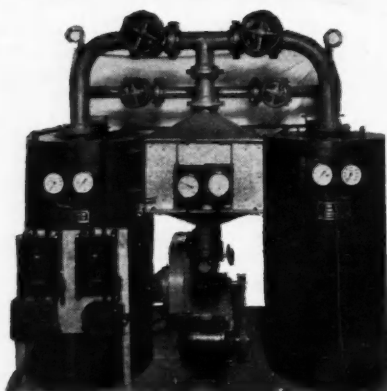
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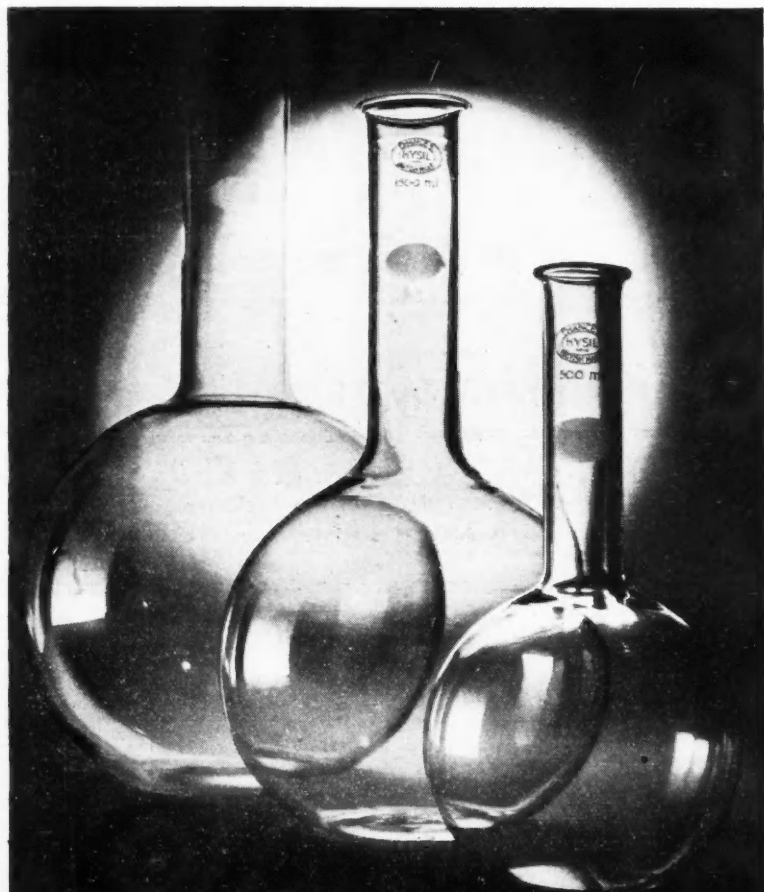
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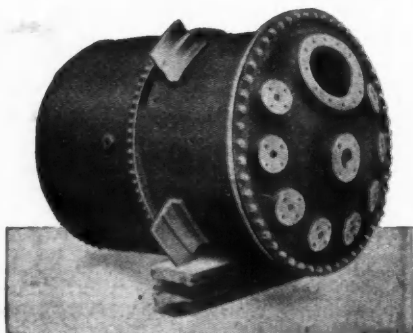
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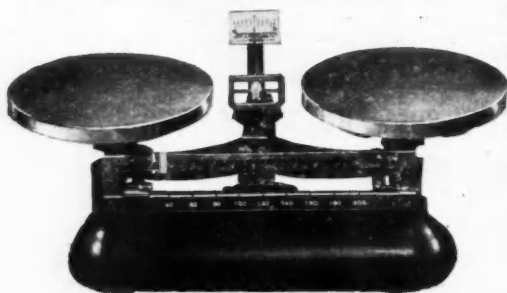
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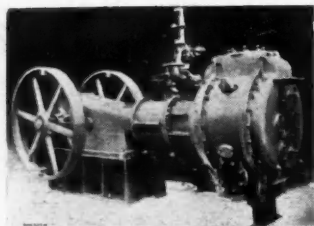


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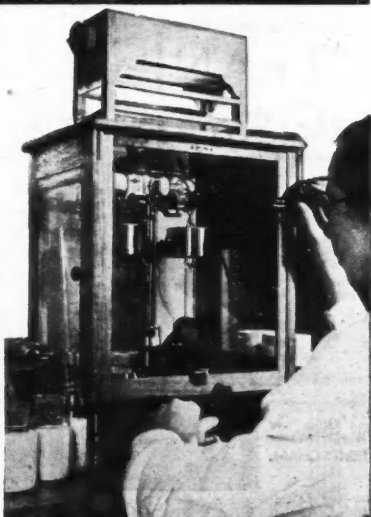
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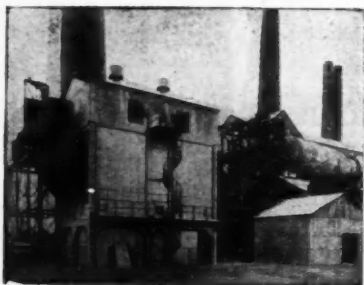
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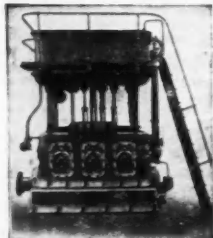
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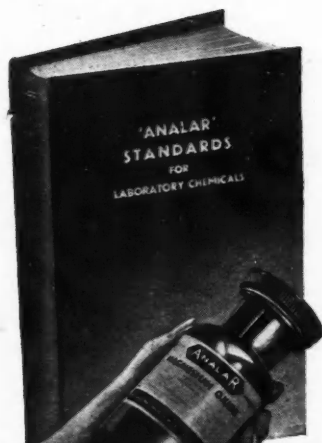
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VOL. LII  
No. 1337.

February 10, 1945

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## The Team

IT is not often that a General in the midst of a fierce, even desperate, battle finds himself able to tell the world the principles upon which he bases his strategy. Field-Marshal Montgomery, the exception in so many ways, has provided the exception in this also. His words have been widely recorded in the world's Press and there is no need to repeat them. But we propose, nevertheless, to quote certain passages of that address delivered to war correspondents, partly because the memory is to-day so overburdened that reiteration is not without its advantages, and partly because, being spoken of war and printed as part of the war news, their larger significance may have been overlooked. This is part of what Sir Bernard Montgomery said:—

"It is team work that pulls you through dangerous times; it is team work that wins battles; it is victories in battle that win wars. I want to put in a strong plea for Allied solidarity at this vital stage of the war: and you can all help in this greatly. Nothing must be done by anyone that tends to break down the team spirit of our Allied team. . . . No one objects to healthy and constructive criticism.

It is good for us. But let us have done with destructive criticism that aims a blow at Allied solidarity, that tends to break up our team spirit, and that therefore helps the enemy.

"This is my military philosophy. A fundamental point is shaping the battle to your design. I always maintain that you have got to decide what your design of battle is going to be before you start the battle, and so you fight it your way and not anybody else's way and make the enemy dance to your tune. I maintain that is the way to fight battles. Now, if you're going to fight battles that way, you've got to have balance or poise—so balanced that whatever the enemy may do there will never be any need for you to react to him. That is the fundamental point in my military philosophy. . . . It is a question of getting balanced and putting reserves in such places that you don't mind what the enemy does because you have grouped your forces to meet the problem. And you must not hurry. You must have a well-balanced, tidy show when you are mixed up in a dog-fight. You can't do it now—I do not think that word is English—you can't win the big victory without a tidy show. . . . It was

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a very remarkable thing to see how, at the moment of danger, the complete Allied team rallied to the call."

The conception of the Allied armies as a team applies directly to industrial organisation and policy after the war. There remain two "battles" to fight when the sword has been sheathed. One of them is to rehabilitate British industry; the other is the larger one of enabling all nations to share in a general world prosperity. Team work is the secret of success in both these high endeavours.

We do not suggest that there is active disruption in this country among our industrialists, or between Capital and Labour, or between any others who should be partners. But the seeds are there. Capital and Labour do not speak with one voice. There is still too much of the spirit of "what are *my* interests" at work on both sides. The interest of all is identical—sound economy and a prosperous and busy industry. We may have different ideas as to how this is to be achieved, but when the war is over, let us work out those ideas as a team and not in wrangling and bitterness.

The chemical industry is composed of many sections. The A.B.C.M. is in itself a *multum in parvo* of these sections. We do not for one moment suggest that any divisions exist between the sections. On the contrary, through the A.B.C.M. they work together for the common good—they are an example of team work. The B.C.P.M.A. is another example of team work. It is an important factor in success, however, that the "battle dispositions" should be "tidy," i.e., that there should be a plan and that the plan should be orderly with everyone in his right place at the right time. Is the whole chemical industry, including the chemical plant side of the industry, so organised for post-war trade, with its "battle" dispositions drawn up, that the "battlefield" will be "tidy?" We doubt it. There are still many loose ends to be tied up. Unfortunately, we have not a commander of the calibre of Eisenhower or Montgomery to tell us how to do this. We must make our own dispositions by the more cumbersome methods of committees—and that will need team-work right from the start.

Then there is the larger problem of bringing the world back to economic

sanity. That is as great a problem for the Allies to face as the problem of winning the war. Because self-interest is likely to figure in it to a greater extent than in war, the forces at work will tend to be more disruptive of team work. But the problem must be solved. This is emphatically a case where, if we do not hang together, we shall all hang separately. Britain, the Dominions and other members of the British Commonwealth, the U.S.A., Russia, and all the Allied nations must face *as a team* the problem of securing prosperity for all, without which there will be prosperity for none. To-day, there are all too many signs of mutual suspicion in the field of international trade, and it is fortunate that in this field there are trusted leaders who can, if they will, dispossess their minds of these petty fears and discuss the problem on a higher plane. We refer to Roosevelt, Churchill, and Stalin. It is in solving such problems that Government assistance is not only welcome but necessary.

The nations of the world and the units of each nation must maintain the team spirit; together they must tidy up the world's industrial policies.

## New Control Orders

### Paint, Varnish and Lacquer Prices

**I**N accordance with the Prices of Goods (Price-Regulated Goods) Order, 1945 (S. R. & O. 1945, No. 68) stain, varnish, and lacquer are added to the schedule of goods price-regulated under the Goods and Services (Price Control) Act, 1941. Briefly, this means that in future all traders dealing in these articles may increase their prices beyond those ruling on August 21, 1939, only to the extent of the actual increase in their costs and expenses, and must be prepared to justify any such increase.

The new Order amends S. R. & O. 1942, No. 794, and re-enacts S. R. & O. 1943, No. 118. It came into force on February 1.

### Antimony

The Control of Non-Ferrous Metals (No. 15) (Antimony) (Revocation) Order, 1945 (S. R. & O. 1945, No. 112), which came into force on February 8, revokes the corresponding No. 8 (Antimony) Order, 1942, under which the disposal and acquisition of antimony metal, crude antimony sulphide, antimony oxide, golden or crimson sulphide of antimony, and antimony ore are subject to licence. Licences will no longer be required for the disposal or acquisition of these commodities.

## NOTES AND COMMENTS

### King Log and King Stork

**A** GALAXY of distinguished speakers graced the mass demonstration of the Society of Individualists and National League for Freedom, lately held at the Central Hall, Westminster, and the sentiments expressed were, in the main, unexceptionable. There can be few who are engaged in the chemical industry, for example, in whatever capacity, who are not convinced of the inadvisability of bureaucratic control; we have all had an inevitable taste of its peculiarities and, because war demanded it, we have submitted with a more or less good grace. But we are far from sure whether we are prepared to go on submitting *ad infinitum*. Some of us, however, are a little nervous about the possible alternatives; we have met worthy individualists, we know of instances of private enterprise whose activities were, without a shadow of doubt, an asset to the community as well as to the actual directors of such enterprises. We have, however, met the other kind as well, and the more defenceless among us cannot be blamed for seeking some protection against these. It may be simply a case of exchanging King Log for King Stork; yet, like the frogs in the fable, we may be pardoned for thinking that some sort of a change might be an advantage.

### Room for Compromise

**S**IR STAFFORD CRIPPS has said that it is the duty of private enterprise to look at its affairs from the national point of view; and if private enterprise will follow his counsel, all will be well. Our leading article last week pointed out some of the dangers to industry which are implicit in allowing Government departments to interfere too much with the country's work. This week we have considered the matter from the other side, with a plea for team work within industry. As we see it, there is safety in the good old English principle of compromise: with an acknowledgment of the truth of Acton's maxim, "All power corrupts," and with an appreciation of the time-honoured saw, "Set a thief to catch a thief," we may be able to

strike a profitable balance between the two sides.

### Adventures in Devon

**B**ETWEEN this war and the last, the Germans shipped barytes to this country and sold it at a price which (to put it mildly) was certainly not economic. One result of this was that our own barytes mines very largely went out of commission, so that at the outbreak of war we found ourselves threatened with a shortage of this essential commodity. Since then, however, home production has been revived, and the story of one instance of this renewed domestic production was told the other day to the Mineralogical Society in London by Lt.-Col. J. V. Ramsden, C.M.G., D.S.O., who is the moving spirit of the Devon Baryta Company and a leading authority on British barytes mining. Apart from a most entertaining account of the misadventures surrounding the revival of the company—which, despite its time-honoured name, does not mine *baryta*—and his own adventures while surveying the property, Colonel Ramsden voiced some most interesting theories about the formation and the location of barytes deposits. In the earth barium is invariably found in association with strontium, which may occur in proportions up to 50 per cent., and with lead, while a less easily explained association is that of manganese, some trace of which is usually found surrounding barytes deposits. It is on the borders of areas of orthoclase (granite or syenite) that barytes occurs (*e.g.*, on the skirts of Dartmoor).

### A Remarkable Theory

**C**OL. RAMSDEN further announced his remarkable discovery of a mineralised vein running north and south approximately along the meridian of 4 deg. W. longitude, with occurrences of barytes and its companion minerals, in Scotland, Wales, Devon and Cornwall, and Brittany. War interrupted his researches in Spain, where the line intersects the lead-bearing region near Cordoba, and he has not yet explored Morocco. It may be noted, however,

that a manganese deposit has recently been exploited N.W. of Colomb Béchar (see THE CHEMICAL AGE, December 9, 1944, p. 538), which is at least an interesting coincidence.

### The Formation of Barytes

**A**S to the formation of barytes, Col. Ramsden's theory that the barium was brought up from the magma as a halide (chloride or fluoride) and, on meeting sulphated meteoric waters near the surface, crystallised out as a sulphate, was disputed by Dr. Dunham, in the brief discussion which followed the lecture. Dr. Dunham pointed out that a sulphide rather than a sulphate would have been expected in such circumstances, and that the barium sulphate occurred in situations where it could hardly have been affected by rain, etc.: the crystallisation of the sulphate would appear to have taken place at a prior stage—an amendment which the lecturer readily accepted. Col. Ramsden exhibited a rough flow-sheet showing the simple method employed for screening and classifying the raw material, and it occurred to us—though we would wish to examine the process in greater detail—that certain improvements could have been introduced at that stage. That, however, was merely a side issue; the important point was the skilled development of a domestic resource. With enterprise of this nature available, we must ensure that we do not find ourselves depending once again on overseas sources of supply, when the relevant material is on tap at our back door.

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### SCIENCE HISTORY LECTURES

The History of Science Committee, which was formed at Cambridge as a result of the Exhibition of Historic Scientific Instruments in December, has received influential backing, as it is realised that more teaching in that field is needed. The opening lecture in a newly-organised series entitled "Science in the History of Thought" was delivered on January 20 by Professor G. N. Clark, who gave an introductory survey of the field from the point of view both of the scientist and of the historian. Later lectures in the series will be given by Professor Raven, D.D., Professor C. D. Broad, Litt.D., and Professor J. R. Partington, M.B.E., D.Sc.

## Creosote-Pitch

### Useful Guide for Consumers

**S**OON after the war started, industrial users of imported petroleum fuel oils were asked to replace them, wherever practicable, by home-produced creosote-pitch mixture. More than 800 plants (of wide variety) have been converted to the use of this fuel and more than 500,000 tons of creosote-pitch mixture is being consumed annually (which is about two-fifths of the total amount of liquid fuel at present burnt in industry).

C/P (as it is now commonly called) should not be regarded as being merely a "second-best" fuel, to be tolerated only until other liquid fuels become available. Generally speaking, C/P is looked upon as a satisfactory alternative to other liquid fuels and as being capable in some instances of improving thermal efficiency. But as with any kind of fuel, best results are obtainable from C/P only by skilled application and careful supervision. Consumers of C/P will be handsomely repaid for any time spent in getting to know more about the characteristics and use of this fuel.

Until now there has been little published information concerning the application of C/P. But now there is available a 24-page booklet which will be of great help to all interested in C/P systems. The booklet is Fuel Efficiency Bulletin No. 36 published by the Ministry of Fuel and Power. The early part of the bulletin gives technical data such as the specified blend, viscosity, calorific value and so on. The next section, on the application of the fuel, is good practical stuff easy to follow and quickly grasped. First, the storage tanks and the methods to be used for keeping the fuel at its proper storage temperature are dealt with. Then there are descriptions of the two main types of C/P system—the ring main system and the gravity feed system. These are very clearly illustrated with all the main parts listed and keyed. No matter what system is in use there are a number of essential points common to all. The bulletin gives these points in quick-reference form. A section devoted entirely to burners is a prominent feature of the bulletin and is followed by a chapter on combustion and air supply.

Consumers of C/P should make a point of obtaining the bulletin at once and of running through it as a check on their system and its operation. Potential users, too, would do well to grasp the opportunity of getting to know at the start just what constitutes a good C/P system and how to get the best results from it. Fuel Efficiency Bulletin No. 36 is available free of charge from the Ministry of Fuel and Power, London, or from Regional Offices of the Ministry.

**FUEL EFFICIENCY IN THE CHEMICAL INDUSTRY**

*THIS is the first of the second series of lectures and discussions arranged by the A.B.C.M., to promote fuel economy in the chemical industry, and dealing with subjects which will lead to efficiency in fuel consumption. Each meeting is held in both London and Manchester, and each lecture and discussion will be fully reported in THE CHEMICAL AGE. The first meeting was held in Manchester on November 15 and repeated in London on November 29; the delay in publishing is due to the care needed in collating the discussions following the lecture, which, as will be seen, is far from being a negligible part of the proceedings. Reports of subsequent meetings will follow at frequent intervals.*

## Fuel Economy Discussions

### I.—The Future of Lime-Soda Softening

by W. F. GERRARD\*

THE lime-soda method is still the process most widely used for softening water on account of its cheapness and simplicity. It is, however, susceptible of improvement. A fundamental difficulty which springs from the basic chemistry of the process is the presence of residual hardness which may persist from a few hours to several days. Numerous expedients have been employed to speed up the process. These include arrangements for heating the incoming water, use of lime and soda in excess of the strict chemical equivalent, addition of coagulants such as aluminio-ferric and sodium aluminate, while in recent years much attention has been paid to catalytic action as, for example, by causing the water to flow through zones of preformed sludge. How can the process be speeded up in the cold?

The root of the lime-soda process is to convert all the calcium into carbonate and all the magnesium into magnesium hydroxide, in which forms they are removed. The reactions should leave the water with a slight free alkalinity, as a protection against corrosion, of between 20 and 50 p.p.m. in terms of  $\text{CaCO}_3$  and of these 10 to 20 p.p.m. should be caustic alkalinity. The solubility of  $\text{CaCO}_3$  (22 p.p.m. in distilled water at 60°F.) and of  $\text{Mg(OH)}_2$  (3.5 p.p.m. at 60°F.) prevents the attainment of zero hardness by the lime-soda method; these solubilities decrease in presence of  $\text{Na}_2\text{CO}_3$  or  $\text{NaOH}$ , but in theory the best one could hope for from lime-soda softening is a residual hardness of between 10 and 20 parts per million of  $\text{CaCO}_3$  and 1 to 3 parts per million of  $\text{Mg(OH)}_2$  dependent chiefly on the numbers of  $\text{CO}_3$  ions maintained in the water and also to a much lesser extent on the temperature and the concentrations of other salts in solution.

It is clearly not good practice to precipitate a carbonate and hydroxide simultaneously from the same solution. Any substance separates most readily as a solid when the pH value of the solution is in the vicinity of that set up by the solid itself

in pure water, and it is quite impossible to maintain two different pH values at one and the same time. It is also unwise to have an amorphous precipitate (e.g., flocculent  $\text{Mg(OH)}_2$ ) present when trying to separate a crystalline precipitate (e.g.,  $\text{CaCO}_3$ ), since the amorphous  $\text{Mg(OH)}_2$  would blanket the crystalline  $\text{CaCO}_3$  and prevent crystal growth. Magnesium forms basic carbonates very readily and for complete conversion to the hydroxide it is necessary to keep the pH value as high as possible, certainly well over 11.0, but if a soluble carbonate like sodium carbonate is deliberately added the odds are strongly against a pH value over 11.0. Since chemical reactions are reversible, with a system of  $\text{Mg}$ ,  $\text{Na}$ ,  $\text{CO}_2$  and  $\text{OH}$  ions in water, a certain amount of  $\text{MgCO}_3$  is to be expected at equilibrium, dependent on the numbers of the individual ions present. Moreover, when soluble carbonates are present, there are three alternative forms that magnesium might choose rather than the hydroxide (i.e., the carbonate, basic carbonate, or double carbonate with calcium, all of them more soluble than the hydroxide) which raises the issues of metastability and supersaturation. In short, if the idea of using lime and soda for softening water had occurred to us to-day instead of to Clarke a hundred years ago, we should have set about the business on more scientific lines. We should not have attempted the simultaneous removal of calcium as carbonate and magnesium as hydroxide, but we would have adjusted the conditions first for removal of one and then the other, just as the chemist does in making a quantitative analysis in the laboratory. This argument was the starting point of our research.

When the cold lime-soda process proves unsatisfactory, it is invariably found that the raw water contains both calcium and magnesium hardness and that the worst results are obtained when the proportion of magnesium hardness is high. Where it gives good results in the cold the hardness is almost entirely due to calcium, or in odd

\* Feedwater Specialists Company.

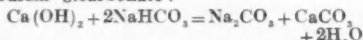


cases, to magnesium. From this reasoning and experimental data a two-stage process was built up in which lime was first added, an interval was allowed for precipitation and coagulation, the solution was filtered and soda was then added. The total reaction time was two hours. The result of series of tests, all in parts per million, was:

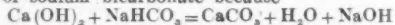
	Raw Water	Lime and soda added together at 58°F.	Two-stage process at 58°F.
Total alkalinity	150	120	64
Total hardness	100	95	40
Calcium hardness	100	40	25
Magnesium hardness	150	55	15

These early experiments proved that, other things being equal, two-stage softening was faster than single-stage softening over any fixed period of time and that the optimum result could be obtained by two-stage softening if the reaction periods were extended far enough.

The time required for complete reaction was still 48 hours and had to be shortened for practical application. It had been noted that the removal of magnesium in the first stage took longer than the removal of calcium in the second, and we therefore tried the effect of progressive increases in lime over-dosage. It was found that quite a small excess of lime had a pronounced influence on the rate of Mg precipitation and that it was useful to add up to 100 parts per million  $\text{Ca}(\text{OH})_2$  in terms of  $\text{CaCO}_3$  in excess of the theoretical quantity. The excess of lime was then removed by adding sodium bicarbonate:



If (as is customary) a slight caustic alkalinity is wanted in the treated water it can be provided by using less than the full amount of sodium bicarbonate because



The process as it had so far developed may be briefly summarised. A measured volume of water was treated with saturated lime water to a theoretical excess of 100 parts per million as  $\text{CaCO}_3$  over the amount required by temporary hardness and magnesium compounds. The water was stirred gently for 30 min. and allowed to stand for a further 30 min., when clear water was drawn off and tested for alkalinity to phenolphthalein and methyl-orange indicators.

The results gave a check on the lime dose calculations. The weights of sodium bicarbonate and sodium carbonate required to destroy the excess lime and remove the permanent hardness were then introduced and the water was again stirred gently and settled for periods of 30 min. The total softening time, exclusive of filtration after the lime treatment stage, was two hours, and softening by this technique was equal to that obtained on the same water in the same period of time by ordinary hot process

(120°F.) with sodium aluminate. The precipitate thrown down in Stage 1 of the modified process had excellent settling properties, but the calcium carbonate from Stage 2 was finely divided and did not filter at all well through coarse material. If, however, the treated water in Stage 2 was passed by upward flow through a bed of crushed limestone or calcite, the removal of  $\text{CaCO}_3$  was complete in about 10 min. Almost any kind of suspended matter will catalyse the separation of  $\text{CaCO}_3$ , and the best results of all were achieved with paper pulp carrying some entrained calcium carbonate. Perfectly clear water containing less than 25 parts per million  $\text{CaCO}_3$  was drawn off by gravity through the filter mat formed by settling the paper pulp after stirring with the water in Stage 2 for 10 min. We then tried the effect of paper pulp on the precipitates in Stage 1 of the process and discovered that the separation of magnesium was likewise as good in Stage 1 as in Stage 2. Rather curiously, cotton pulp was not nearly so effective as paper pulp as an accelerator for magnesium separation.

### Silica Removal

Magnesia is a valuable reagent for removal of silica from water, and we have found that the modified softening process automatically reduces the silica content to less than 4 p.p.m., as against 7 p.p.m. by the hot lime-soda-aluminate process. However, the conditions which govern the precipitation of silica with magnesium hydroxide are not yet closely understood and the trials must be extended to more types of water supply before claims can be put forward with the same quantitative accuracy as for removal of calcium and magnesium.

### Calculation of Chemical Quantities

An example of the calculations involved in the use of lime, sodium bicarbonate, and sodium carbonate according to the new technique, along with the corresponding figures for orthodox practice, will be of interest. For the purpose of this illustration it will be assumed that the reagents are 100 per cent. pure. A sample of hard water from a colliery has the following characteristics:

Temporary hardness	275	pts.	per million
Permanent hardness	210	"	"
Calcium hardness	345	"	"
Magnesium hardness	140	"	"

### New Technique

Stage 1.—Lime is added equivalent to the sum of temporary hardness and magnesium hardness plus an excess equal to 100 p.p.m. at  $\text{CaCO}_3$ , i.e.:

$$(275 + 140 + 100) \times \frac{74}{100} = 381 \text{ p.p.m.}$$

= 3.81 lb. per 1000 gal.  
After the scheduled time for reaction and



filtration, the water is tested for alkalinity. Let it be supposed that 100 ml. of the treated water require 1.75 ml. N/10 acid to phenolphthalein indicator and 0.15 ml. to methyl orange indicator. Caustic alkalinity, i.e., excess lime = 1.60 ml. N/10 on 100 ml. or 80 p.p.m. as  $\text{CaCO}_3$ .

*Note.*—Discrepancy between theoretical and actual excess lime may be due to small experimental error in the raw water analysis or to traces of free  $\text{CO}_2$  in the water.

**Stage 2.**—Water leaving Stage 1 is treated with that amount of sodium bicarbonate which will leave 20 p.p.m. of caustic alkalinity and destroy 60 p.p.m. of excess lime in accordance with the equation:

$$\left(60 \times \frac{168}{100}\right) = 101 \text{ p.p.m. NaHCO}_3$$

$$= 1.01 \text{ lb. per 1000 gallons.}$$

When this reaction takes place 60 parts per million of sodium carbonate are produced, leaving 150 parts per million out of the original 210 parts per million of permanent hardness and 20 parts per million of excess lime to be dealt with by sodium carbonate.

$$\left(170 \times \frac{106}{100}\right) = 180 \text{ p.p.m. Na}_2\text{CO}_3$$

$$= 1.80 \text{ lb. per 1000 gallons.}$$

For practical working purposes the chemical charges would probably be: 4 lb. lime; 1 lb. sodium bicarbonate; 2 lb. soda ash. At £3 per ton for lime, £11 per ton for sodium carbonate, and £8 per ton for soda ash, the cost of chemicals would be 4.2d. per 1000 gallons.

### Orthodox Procedure

Theoretical lime requirements:  $(275 + 140) \times 74/100 = 306 \text{ p.p.m. or } 3.06 \text{ lb. per 1000 gallons.}$

Theoretical soda requirements:  $210 \times 106/100 = 224 \text{ p.p.m. or } 2.24 \text{ lb. per 1000 gallons.}$

Practical working quantities would be, allowing the usual margin for alkalinity in the treated water:  $3\frac{1}{2}$  lb. lime and  $2\frac{3}{4}$  lb. soda ash, costing 3.6d. per 1000 gallons. Thus, even on the minimum cost basis for the orthodox process, the new technique is only a trifle more costly. If a comparison were made against hot process sodium-aluminate softening the new technique would be considerably more economical.

Water having the analysis shown in the foregoing example treated by the two-stage method with the calculated amounts of lime, sodium bicarbonate, and sodium carbonate, and with paper pulp as catalyst and filtering medium in both stages, was softened down to 27 parts per million as  $\text{CaCO}_3$  (comprising 24 p.p.m. calcium hardness and 3 p.p.m. magnesium hardness) in a total softening time of 30 min., 15 min. in each stage. The same water treated with lime and soda simultaneously in accordance with the calculation retained more than 200 parts

per million of total hardness as  $\text{CaCO}_3$  after 30 min., and even after two hours the residual hardness exceeded 100 parts per million.

The advantages claimed for this process, for which a patent has been applied, are:

1. Hardness is reduced to within 10 parts per million of the theoretical minimum.

2. Silica is reduced to a comparatively low figure.

3. Alkalinity of the treated water can be anything one likes to make it, either as regards kinds or quantity. In other words, the residual alkalinity can be independent of the softening process proper.

4. The foregoing performance is achieved in the cold without use of chemical coagulants and is applicable to all kinds of waters so far as laboratory data can show.

5. Because of the short reaction period the plant is relatively small, requires little or no prepared foundation, and much less head room than the ordinary plant.

6. The component parts can be prefabricated and supplied from stock immediately on receipt of order.

7. Unit construction enables the consumer to adapt the installation to changes in water demand. If consumption increases he adds one or more units. If consumption decreases one or more units are shut down with consequent saving in power.

8. There are only two daily tests to be made and a chart could be supplied showing the reagent quantities required according to the test results. With such a chart no chemical calculations by the operator would be necessary.

9. Overhaul, maintenance, and repairs would be lighter than with the usual cumbersome lime-soda plant.

### Discussion

**Q.**—At what stage is the development of this process?

**A.**—It has not yet reached the pilot-plant stage.

**Q.**—At what temperature will the new process be conducted?

**A.**—Atmospheric.

**Q.**—Is that an advantage?

**A.**—Yes. The capacity of the plant would be increased and heat would be saved.

**Q.**—What is the best temperature for the normal lime-soda process?

**A.**—The time for completion of the reactions is more or less inversely proportional to the temperature.

**Q.**—In the new two-stage process would a solution of lime or milk of lime be used?

**A.**—While a lime solution would be more convenient for measurement, lime is only slightly soluble (0.165 per cent.  $\text{Ca(OH)}_2$  at  $15^\circ\text{C.}$ ) and as a rule milk of lime would be employed.

Q.—How can lime sludge be disposed of, *e.g.*, at waterworks?

A.—No universal solution has been found. It is often dumped, and this would be rendered easier if it could be produced crystalline. Sometimes it is used as fertiliser in agriculture, especially when mixed with the waste from sewage farms; this is difficult in industrial districts.

Q.—Will variation in  $O_2$  content of water supplies affect the working of the new process?

A.—This has not been studied but there is no obvious reason why it should do so.

### Design of Plant

Q. Could the necessary plant be indicated?

A.—Two vessels will be needed, identical in size and shape, preferably with a conical base. These vessels would have a total combined water capacity much below that of the normal vertical softening tank, because the reactions would take place very much faster. The process is complete in less than half an hour, whereas the ordinary double-precipitation process is often far from complete in 3-4 hours. Arrangements would be required for the incoming water and the lime to meet at a suitable point in the first reaction vessel, which might include some arrangement for tangential flow or a stirring device. There might also be a filter at the top of the vessel capable of retaining flocculent particles of magnesium hydroxide and some of the entrained chalk. Water could be drawn from a point above the filter and led into the bottom of the second reaction vessel where it would meet the calculated quantity of sodium bicarbonate and, if need be, sodium carbonate, and the precipitation of calcium carbonate would then ensue in a zone of preformed sludge or seed specially provided, such as limestone granules. An additional filter could be incorporated towards the top of the second vessel and the final water drawn off to service.

Q.—Where would the paper pulp for coagulation be added and where would the  $CaCO_3$  filter be placed?

A.—There are two possible modifications which remain to be tried out on the pilot plant. Perhaps the most practicable method will prove to be the maintenance of a large reserve of precipitate brought out under the operating conditions of the process in Stages 1 and 2, the quantity of sludge retained in each vessel being controlled by continuous blowdown.

Q.—Does the efficiency of a wood-wool filter decline in service?

A.—The longer a lime-soda plant has been at work the better the standard of hardness removal, but occasionally the wood-wool filter does tend to become choked and clogged with the products of softening, so

that the water passes through channels by selective flow and the wood-wool ceases to act as a filter. Hence, it is suggested that while the wood-wool filter containing softening plant sludge is still discharging its proper functions as a filter, it does assist in bringing about removal of the hardness from the water. On the other hand, when it becomes choked the water will tend to become cloudy, proving that its *efficiency as a filter* has diminished.

Q.—Is all the  $CaCO_3$  removed from the system in the first stage?

A.—No. Some  $CaCO_3$  is precipitated, but we aim to remove magnesium completely in the first stage and calcium in the second. If the magnesium is not removed, it will tend to redissolve on adding sodium carbonate or bicarbonate.

Q.—What space will be needed?

A.—Very much less than for the ordinary lime-soda process.

Q.—What time will be needed? We allow four hours.

A.—We hope to do the same job in half an hour, including cleaning the filters.

Q.—How will the two-stage proportioning be arranged?

A.—We shall have two independent gears, one for each vessel.

Q.—What advantages will accrue from the smaller size of plant?

A.—(1) It will be more competitive at home. (2) The export market will be favourably affected. (3) Lime-soda softeners might be installed on ships.

### Controlling the Process

Q.—Is skilled control necessary, *e.g.*, in a small works without a chemist?

A.—The new process should be easier to control than the old one because there are separate checks on each reagent, but any water-softening process should be in the hands of someone who understands it. The plant manufacturer will instruct some intelligent person in the principles of plant operation sufficiently to allow him to operate it. It should be possible also to supply some kind of direction sheet, showing what quantities of lime should be added, what adjustments should be made when certain readings were given by the phenolphthalein indicator, and what adjustments should be made in respect of the sodium carbonate and sodium bicarbonate if the phenolphthalein readings are not as they should be. I have worked out a sheet of that kind, so that I know it is possible. Even so, it would not be advisable; a chemical process should, as far as possible, be handled by a chemist.

Q.—Can some advice be given on caustic embrittlement and how to avoid it?

A.—The risk of caustic embrittlement in boilers is a consequence of not maintaining the correct boiler-water conditions. Given

the maintenance of certain ratios, notably between the caustic alkalinity and the sulphate content of the boiler water, embrittlement will not occur. Caustic soda can be produced in a boiler, even though caustic soda has not been used as a softening agent. If excesses of lime and soda are used in a softening process, caustic soda is produced in the treated water. Again, if softening with soda ash alone, and the dose is greater than is really required for the softening, the excess sodium carbonate will pass to the boiler and will be hydrolysed into caustic soda. So that since any kind of soda alkali, except sodium phosphate, finishes eventually in the boiler as caustic soda, care must be taken to avoid excess alkalinity in the boiler. If caustic soda is used in the softening process, use only the amount required for the softening.

Q.—Is it not a fact that up to about 200 lb./sq. in. pressure there is not much risk of caustic embrittlement?

A.—In a shell boiler at 120 lb./sq. in. pressure the risk is so slight that it can be almost ignored. Caustic embrittlement is extremely rare in that type of boiler at the pressures mentioned; but when it does occur it is so serious that it is worth while taking the precautions for the sake of personal safety.

Q.—Does not the conversion of sodium carbonate to caustic soda occur only at fairly elevated pressures?

A.—No; it takes place quite readily. There can easily be a 50 per cent. conversion of sodium carbonate to caustic soda in a boiler in which the pressure is as low as 100 lb./sq. in., if that boiler is kept at work for a sufficient time, e.g., for weeks on end, as is usually the case.

Q.—That is important, because there is an impression abroad that it can take place only at fairly high pressures.

A.—Some people think they can do as they like with a low-pressure shell boiler.

Q.—What is a wise limit to allow for caustic alkalinity?

A.—There is no standard figure, but it can be as high as 500 p.p.m. in a Lancashire boiler provided there is enough sulphate present to cover against embrittlement.

Q.—Caustic soda is being used for softening and the boiler is kept clean without much extra expense. Is this to be recommended?

### Caustic Soda Softening

A.—Caustic soda softening is all very well when the water is of the type that lends itself to treatment by that method. The temporary hardness of the water should be approximately equal to its permanent hardness, because the first reaction is that between the caustic soda and the bicarbonates or temporary hardness in the water, the bicarbonates being converted into the nor-

mal carbonates. At the same time, the soda is converted into sodium carbonate, which is the reagent required for the removal of permanent hardness, and this is probably the reason why less chemicals were needed than was expected; the production of sodium carbonate, which becomes available to combine with the permanent hardness, must not be overlooked. That is the reason why the process does not work out to be as costly as it may seem to be at first; you are getting free of charge the reagent required to remove the permanent hardness.

If, however, the temporary hardness of the water greatly exceeds the permanent hardness, as it does in most London districts, the story is a different one. The London metropolitan supply is peculiarly unfavourable to complete caustic soda softening, because the amount of permanent hardness is nothing like equivalent to the amount of sodium carbonate produced, and there remains a lot of free sodium carbonate in the treated water. This excess of  $\text{Na}_2\text{CO}_3$  hydrolyses to caustic soda, sets up high alkalinity, induces risk of caustic embrittlement, attack on fittings, and many uncomfortable things. So that if it is desired to use caustic soda for softening water, make sure that the excess of temporary hardness over permanent hardness is not too great.

Q.—With the new process is there any restriction on the type of raw water?

A.—No. The chemical principles are not changed and any water can be softened that lends itself to the lime-soda process.

Q.—What is the effect of this process on fuel consumption?

### Avoidance of Tall Towers

A (by a member).—I have no detailed figures with me, but on our load of 35,000-45,000 lb. per hour I calculate that the loss of heat from our settler, unlagged, is equivalent to about 270 tons of coal a year. That is a pointer, indicating what it costs to use hot softening. But, of course, often there is a lot of low-grade heat; that invalidates a lot of these conclusions. I have concluded that, in laying out a new boiler plant, one of the most important factors is to have the top of the water softeners level with the firing floor. . . . I am much attracted by any plant which has not a tall tower. Three attractive factors in Mr. Gerrard's process are no heat, short vessels, and two points of check for hardness. Further, anything which will get rid of wood-wool seems to be worthy of great attention.

A.—It is not essential to have the reagent-mixing vessels on the top of the softeners in all cases; it is on some standard types, but in some plants the mixing vessels can be at ground level and pumps can be used.

## LETTERS TO THE EDITOR

## Waste Paper and the Chemist

SIR,—I have read with great interest in your issue of January 27 the Notes and Comments regarding "The Broom as Weapon," "Salvage in Action," and "Paper Control," and beg to say that we chemists have a particular interest in the further pursuance of the problems associated with these three matters.

Dealing with the question of Paper Control first, I myself have been able to gather certain experience here in regard to this subject. I have seen that waste paper is methodically collected and put to useful purpose in already existing, relatively simple plant, but that the paper is used almost exclusively either for the production of cardboard and packing paper, or for toilet paper. No interest, however, has been devoted to the all-important question of recovering newsprint by de-inking, despite the existence of very simple processes for doing so, whereas in America this is carried out on an extensive scale. Whether this is due to the fact that it has not been possible to reach a decision to manufacture cardboard from straw (the so-called "Dutch Board"), or whether certain interests or other reasons have so far prevented the development of so important a national industry, it is hard to tell from the technical standpoint.

With the same equipment, however, as that with which waste paper can be converted into cardboard, it is possible in a very simple manner to produce strawboard of quite outstanding mechanical strength; moreover, by this method, the consumption of alkali is very small, so that the greatly deplored pollution of watercourses, etc., by the waste liquor can be precluded. Furthermore, there are ways and means of reusing the waste liquor by recycling it until it is enriched sufficiently for passing on to the chemical industry for distillation and recovery of the alkali content out of the pitch or ash.

One prevalent objection to the treating of straw is that the great number of straw heaps (some of them years old) lying about in agricultural areas will be required later on for cattle-breeding and litter purposes. This argument is hardly justified, because wherever straw has been pulped by chemical means for this purpose, the fodder-value has fallen; consequently, the straw thus processed works out more expensive than any corresponding quantity of high-grade cattle-food.

From observations of my own, there are thousands upon thousands of tons of straw available, all over the country, for chemical treatment and national requirements, for the production of every kind of unbleached pack-

ing paper and strong board; at the same time there are the processes for the de-inking of newspaper which have reached a stage of high technical development, with which to keep newsprint, etc., in recirculation. It is maintained that no shortage of cellulose material should be experienced now or later.

The treatment of straw for writing paper is not generally advisable, but the import of cardboard and other Kraft-paper commodities should become superfluous. This is a task for the chemist to deal with.—Yours faithfully,

F. FRANK, Dr. Phil.

## Scientific Publicity

SIR,—I welcome the appearance of your leader of January 27, entitled "Scientific Publicity—and DDT." I do so because I consider it important that the industrialists, technologists, and scientists who read papers like THE CHEMICAL AGE should begin to give attention to such facts. With some of the conclusions I find myself in almost diametrical disagreement, but then my experience of the same problem has been from a somewhat different direction.

On this matter of credit: I quite agree that due credit must be given to British work; but one finds to-day that one cannot print anything at all about many lines of British work. There is a multi-layered sieve in which come the censor, with his parrot cry about "security considerations" (which quite often is wrongly used to cover up a very different kind of ban on publication), and the public relations officer, with his talk of "unauthorised stories." So often the editor or the staff journalist meets, where no security consideration is involved, a secretiveness that is as obstinate as it is foolish. Often, in despair, one is forced to print a little American news (a) because there might otherwise be a blank column, and (b) because one hopes that the fact of printing American news about some development which originated in Britain may lead to pressure upon censors and public relations officers to make them release some scintilla of information that has long been valueless to the enemy.

This matter of wrong apportionment of credit is no new thing. You find it even in scientific literature. I can produce British books which say that Gowland Hopkins was the discoverer of vitamins, and American books which give all the credit to McCollum. To take another instance: Engler, the famous German botanist, renamed the plants from a particular part of the British Empire because it was quicker to do that than to look up the British literature in which the majority of types had already been carefully described and satisfactorily labelled! It is hardly to be hoped that journalists will emulate Solomon when the scientists themselves have struck no nice

balance between the claims and counter-claims of rival workers. One notes with regret, for instance, that accounts of penicillin in British scientific journals give all the credit to British workers and none at all to the American scientists and chemical engineers who put production on to a substantial scale and so helped to guarantee supplies of the drug for British troops!

Let us turn a moment to DDT. The release of news about DDT in Britain did not occur until a number of American papers carrying technical accounts had arrived in Britain. Then the news release was first made, quite wrongly in my opinion, to the lay press of this country and not to the technical press. It came from the Ministry of Information, and in it the chemical name of DDT was not even spelt right! Incidentally, I recall that the story emanated from the *Military Affairs* division of M.O.I. One cannot help regretting that there is no Scientific and Technical Affairs side of equivalent rank, but then M.O.I. was not designed to operate at technical press level except in so far as censorship is needed.

As editor of *Discovery*, I receive rather more than ten times as much material of scientific and technical interest from the American Office of War Information than I do from M.O.I. Moreover, the American material is more suitable for my purposes, having been written to meet the requirements of editors of technical and scientific journals, whereas the M.O.I. stuff has been written only with the lay press in view!

For reasons of professional patriotism I naturally resent the implication that British journalists as a class are beyond all hope. I feel the remarks at the end of the leader are in fact a most unscientific generalisation based on insufficient data. I think readers should ask themselves whether British journalism, taking into account all our journals which heavily counterbalance the effect of our daily papers, is so inferior to that of, say, America, France, and Russia. In the field of popular science to which your leader writer appears to refer it is very doubtful whether the American press is better served than the British; there is certainly more popular science, but most of the specimens I see do not substantiate the idea that the British material is inferior in quality—rather the reverse.

I feel myself that it is time that this "pot calling kettle black" business between scientists and journalists came to an end, and some basis of co-operation was sought. It is undeniable that there is a great need for the advances of science and technology to be publicised intelligently. To that end co-operation is essential. It is no good saying that it is impossible; that view will lead to utter and complete reliance upon the public relations officer system, which if carried too far can result in there being no

papers in which to print the P.R.O.'s blurbs! Instead of real papers and magazines, one can envisage a heyday of "house organs"!

Some time ago in *Chemistry and Industry* I urged the formation of a Guild of Science Writers, which is very much needed in this country. The response to that letter suggests to me that this is one of the routes which will lead to the closer liaison between science and the outside world that is required.—Yours faithfully,

WILLIAM E. DICK,

Editor, *Discovery*.

## Science in the Empire

### Professor Hill on Co-operation

A PROPOSAL for greater scientific co-operation within the Empire was made by Professor A. V. Hill in an address to the Royal Empire Society on Wednesday of last week, as the initial step towards world co-operation. He suggested that the Society should summon an Empire Scientific Conference as soon as possible after the war, at which some 60 delegates from the Dominions, India, and the Colonies should meet 40 delegates from the United Kingdom. Preliminary arrangements are now being made for such a conference.

### The Report on India

It will be recalled that Professor Hill visited India last winter to report on the position of scientific research and teaching, and described his experiences and conclusions in the Messel Lecture delivered before the Society of Chemical Industry in October (see *THE CHEMICAL AGE*, October 21, 1944). A summary of his findings has now been issued by the India Office embodying his main observations; the full report has been published in India, but is not yet available in this country. Our readers may be reminded that his recommendations included the setting up of an Indian Scientific Office in London, that representative Indian scientists should be attached to the British Commonwealth Scientific Office in Washington, and that a Central Organisation for Scientific Research should be set up in India under a Minister without ordinary departmental duties.

Professor Hill has now stressed, in addition, the need in India of a central scientific academy comparable with the Royal Society, and has indicated that the National Institute of Sciences in India was the body best suited to this purpose. For scientific research, a carefully thought out policy with regard to grants to universities is necessary, and private benefactions to this end also are urgently required.

## Personal Notes

MAJOR D. G. PROSSER has been elected to the boards of Barry & Staines Linoleum, Ltd., and Ostlere & Shepherd, Ltd.

MR. ALEXANDER PEET has been appointed chairman of the Institution of Factory Managers; the new vice-chairman is Mr. W. SCOTT ANDERSON.

MR. and MRS. W. B. B. QUIBELL, of Newark, Notts., celebrated their golden wedding anniversary on January 24. Mr. Quibell was a director of Quibell Bros., and later of British Glues and Chemicals, Ltd.

THE MARQUESS OF LINLITHGOW, who joined the board of the Midland Bank in May, 1944, has been elected Chairman of the Bank and of the Midland Bank Executor and Trustee Company, Limited.

DR. B. LYTGOE, formerly Lecturer in Organic Chemistry at Manchester University, has now rejoined the research team under Professor A. R. Todd, F.R.S., the new Professor of Organic Chemistry at Cambridge.

SIR C. J. MARTIN, Hon. M.A., D.Sc., has been nominated by the Department of Scientific and Industrial Research to be a member of the managing committee of the Cambridge University Low Temperature Research Station until 1949.

MR. JOHN BIBBY, of J. Bibby & Sons, Ltd., seed crushers and oil cake manufacturers, Liverpool, has retired from business life and has been elected to honorary life membership of the Seed, Oil, Cake and General Produce Association (Inc.) of Liverpool.

PROFESSOR ROGER ADAMS, head of the department of organic chemistry in the University of Illinois and a past-president of the American Chemical Society, has been elected chairman of the board of directors of the American Chemical Society in succession to the late Dr. Thomas Midgley.

SIR JOHN BOYD ORR has announced his intention of resigning from the directorship of the Rowett Research Institute, which he has held since its foundation. He will continue as Professor of Agriculture in Aberdeen University and as head of the North of Scotland College of Agriculture. Sir John has been approached with a request to stand as a Parliamentary candidate for the Scottish Universities at the General Election, but recently stated that he had not reached a decision.

MAJOR G. A. MACDERMOTT, who was elected alderman for the West Derby division of Lancashire at last week's County Council meeting, is chairman of the Hutchinson Trustees, Widnes, and a grand-

son of the late John Hutchinson, one of the pioneers of the Merseyside chemical industry. Major MacDermott is a member of the executive council of the Widnes Chamber of Commerce, and a vice-chairman of the Widnes Division Conservative Association.

## Obituary

MR. JACK CARNELL, head of the statistical department of Boots Pure Drug Co., Ltd., has died at the age of 40. He was a member of the council of the Nottingham Chamber of Commerce.

MR. PERCY PRITCHARD, deputy-chairman and joint managing director of Birmid Industries, past-president of the British Cast Iron Research Association, and an authority on metallurgical engineering, died suddenly in Birmingham on February 2, aged 52.

MR. SAMUEL ANDREWS, B.Sc., A.R.C.S., who died at Sidmouth, Devon, on January 20, aged 66, was educated at the Royal College of Science and at Birmingham University. He was elected a Fellow of the Royal Institute of Chemistry in 1902, but ceased to be a member some 10 years ago. For some years he was a chemist at the Royal Arsenal, Woolwich, and later served as an Examiner at the Patent Office, until he retired owing to ill-health in 1935.

DR. ALEXANDER DUCKHAM, F.C.S., F.Inst.Pet., Ph.D., who died in London on February 1, was chairman of Alexander Duckham & Co., Ltd., lubrication technologists, and chairman and governing director of Trinidad Central Oilfields, Ltd. He was one of the pioneers in the exploitation of Trinidad petroleum. His many benefactions to the Royal Air Force included the gift, with maintenance, of his country house, Rook's Hill, Sevenoaks, to the R.A.F. Benevolent Fund to be used as a home for the children of R.A.F. personnel who lost their life in flying. He was 67 years of age.

MR. DOUGLAS ARCHIBALD MACCALLUM, F.R.I.C., who died at Glasgow on January 26, aged 74, was well known in Glasgow as a consulting metallurgical chemist. Educated at the Glasgow and West of Scotland (now the Royal Glasgow) Technical College, he served as chemist in many well-known Scottish iron and steel firms, including William Beardmore & Co., Denny & Co., the Steel Company of Scotland, and J. Dunlop & Company. Since 1901 he had been conducting his own practice as a consulting chemist. Over 50 years ago, in the Coatbridge Technical Institute, he founded the West of Scotland Iron & Steel Institute, of which, at his death, he had filled the post of secretary for 30 years. He had also served as chairman of the Glasgow section of the Society of Chemical Industry; his F.R.I.C. dated from 1918.



# German Patents After the War

## Strict Control Essential

by S. MITTLER, A.F.R.Ae.S., A.M.I.Mec.E.

**T**HIS subject forms part of the general problem: How to win the peace? How to prevent the Germans from attempting world domination again and again, by force of arms or by other means? It does not concern specialists only but it affects men, women and children all the world over. It is, unfortunately, still true that wide sections of the public do not realise what a terrific grip Germany had before the war on some industries in Allied countries, particularly on the chemical and electrical industries, and to what extent this was due to their taking out patents, hence deriving tremendous advantages for the preparation of war.

The Germans have developed a special technique of roping-in a certain field of manufacture by an elaborate system of patents without disclosing the special experience necessary to make something commercially workable which would just be possible in a laboratory, following the information given in the patent specifications. Thus they succeeded in discouraging possible competitors, while drawing royalties for licences without giving any real value in return. The secret of the invention was usually revealed under cartel arrangements only, by which the Germans obtained valuable information about Allied inventions, in addition to foreign exchange, both of which they used in the preparation of the war. Often enough they cheated their cartel partners in the same way as they did, under their barter trade agreements, when supplying mechanical toys or mouth organs for valuable raw materials or foodstuffs.

### Royalties

Since the outbreak of war, German patents in Allied countries are under the administration of a Custodian of Aliens' Property. The Patent Office has the power to grant licences to Allied manufacturers wanting to use them. It is very essential that royalties for such use should not reach the Germans after the war either directly or indirectly through cartel arrangements; they should be paid on reparation account or into a relief fund for the victims of Nazi atrocities.

This, however, is not sufficient; were the patents themselves returned to the German patentees after the war, they could then exact royalties from those Allied manufacturers who wished to continue production for which they may have made considerable capital outlay, or could even stop them from producing goods essential for post-war economy, such as artificial fertilisers, dyes,

medicines, radio equipment, etc. The public would either have to pay increased prices or to go short of these things, and the Germans would again obtain the foreign exchange needed for the preparation of the next war.

In order to prevent that, I suggest continuing the war-time administration of German patents after the cessation of hostilities for the rest of their period of validity and confiscating royalties due to their extended use for the benefit of the above-mentioned fund. Another writer has suggested confiscating the German patents altogether and disposing of them among Allied firms that have taken an interest in them.

The German Government has issued a decree enforcing the disclosure of all inventions and has been subsidising patents both in Germany and in the occupied countries. If the Germans were allowed, as they were after the first world war, to claim under International Convention the early filing dates of these war-time patent applications for corresponding post-war patent applications in Allied countries, they could establish a virtual monopoly there. The benefit of the International Patent Convention should, therefore, be denied to them for such patents.

### In Occupied Countries

In occupied countries the Nazis have systematically looted everything; they stole the patents together with the firms they incorporated into the Hermann Goering Werke or into similar concerns, or they "bought" patents at a purely fictitious price. Many pre-war patents in occupied countries had to lapse because their owners were murdered, driven into exile or underground, or ruined financially so that they could not afford the renewal fees. Other patentees dropped their patents, as they could not protect them from being infringed by Germans or collaborationists. All these patents ought to be restored to their rightful owners or to their heirs, or if the Nazis did their work so thoroughly that no heirs can be found, to the above-mentioned fund. Action for damages against German and collaborationist users of such inventions should lie, regardless of whether the patents had lapsed during the occupation. Nazi and collaborationist-owned patents should be confiscated.

In Axis territory all patents and "useful models" (*Gebrauchsmuster*) should be taken over by an international authority, Allied, neutral or émigré owners of such

patents or Axis citizens who can prove their anti-Nazi activities would get their patents back. All other patents, however, should be kept in force at the cost of their former patentees for their maximum period plus the number of years during which they could not be properly exploited because of the war. Thus, the former Nazi or collaborationist patentees could be stopped individually from continuing the use of these patents if the Allied authority does not prefer to let them pay royalties just the same as any other user.

This procedure would have the special advantage that a control could be kept over the individual German manufacturer and

that indemnities could be enforced individually from the most guilty and at the same time financially potent persons or firms. This would be more effective than a claim for reparation against the government as a whole, which was so cleverly evaded by the Germans after the last war.

It will require the combined efforts alike of lawyers and experts, representatives of governments and industry, to work out a detailed programme of measures to be taken against Germany in this field, and a high priority should be given to this work. This time we have not merely got to be prepared, but we have to remain prepared.

## Parliamentary Topics

### Oil-Refining Industry

**I**N the House of Commons last week, Lady Apsley asked the Minister of Fuel and Power whether it had yet been decided, in order to economise foreign exchange and on strategic grounds, to establish an oil-refining industry in Britain after the war.

Major Lloyd George: A substantial oil-refining industry already exists in this country, though the scale of its operations is at present limited by war exigencies. The question of post-war expansion of this industry is being kept under review.

Asked whether the West Country would be considered in the future as being in a suitable position for an oil-refining industry for the post-war period, the Minister required notice.

### Felspar in the Hebrides

Mr. M. Macmillan asked the Secretary of State for Scotland whether it had now been decided to continue working the felspar quarries in the Isle of Harris after the war.

Mr. Johnstone: The felspar quarries in the Isle of Harris have been worked during the war on behalf of the Ministry of Supply. The Scottish Council on Industry are in consultation with the Ministry, the Geological Survey, and other authorities, examining the possibilities of utilising these deposits after the war.

### Oil Policy

Mr. A. Edwards asked the Foreign Secretary for a statement on the Government's oil policy in connection with the re-drafting of the Anglo-American Oil agreement, and what steps were taken to get the Soviet Union, the Netherlands, and Mexico to participate in a new agreement.

Mr. George Hall said the Government was at present awaiting an approach from the U.S. Government with a view to discussions on the amendments to the agreement which the U.S. Government was

understood to be considering. Until these discussions were completed the question of the participation of other Governments in the agreement would not arise.

Mr. Edwards also asked whether the exchange of views between Britain, U.S., and Russia on their oil policies in Iran had been terminated; and what result, if any, had been achieved.

Mr. Hall replied: "No detailed discussion has yet taken place, but I am hopeful that the views of the three Governments, and those of the Persian Government, will in due course be found to be substantially in accord."

### Science Graduate's Employment

In reply to Sir E. Graham-Little who referred to the case of an honours science graduate of London University who was called up in June, 1944, while filling the post of chief assistant master in a technical school, to act as a clerk in the R.A.F. and perform duties within the competence of an untrained W.A.A.F., and who is anxious to use his special abilities in an occupation more essential for the prosecution of the war, Sir Archibald Sinclair said he would look into the case.

### Fertilisers

Lady Apsley asked the Minister of Agriculture whether, in view of the need to use home-produced fertiliser substitutes for imported fertilisers, is he yet in a position to state the results of his investigations as to methods of using domestic sewage sludge compost with straw and waste.

Mr. R. S. Hudson: Sewage sludges, whether used alone or composted with other materials, have been shown to have value as fertilisers. This value varies widely with the type of sludge, and the soil and crop to which it is applied. Research on this problem is being actively continued and the results are made known to the appropriate technical officers whose duty it is to advise in specific cases.



## General News

**Workers in Royal Ordnance Factories** have contributed over £18,000 in pennies to the Red Cross Penny-a-Week Fund.

**"Non-Benzenoid Aromatic Systems,"** was the title of a lecture given by Professor Wilson Baker on Friday last at Sheffield before the Chemical Society and the University Chemical Society.

**The British Burmah Petroleum Company,** having disposed of its interests in Trinidad Consolidated Oilfields, Ltd., announces that its three representatives have retired from the board of that company.

**An offer** from the Rockefeller Foundation to provide £1200 during the year beginning March 1 for biochemical investigation of penicillin, under the direction of Sir Howard Florey, has been gratefully accepted this week by the University of Oxford.

**A useful series of references** to fumigants, sprays, and washes effective against mite-infestation is contained in the *Supplement to the Survey* (by M. E. Solomon) on *Tyroglyphid Mites in Stored Products*, issued by the D.S.I.R. (H.M.S.O.; 3d. post free).

**The following DTD Specifications** have been issued by the M.A.P.: No. 197A, aluminium-nickel-iron bronze bars, forgings and stampings; and No. 416, compressed asbestos fibre jointing with wire mesh insertion.

**The Tilden Lecture** was given last Thursday, at a joint meeting of the Bristol and South-Western Counties Section of the Chemical Society, the S.C.I. and the R.I.C., by Professor J. M. Robertson on the subject of "Diffraction Methods in Modern Structural Chemistry."

**The Trading with the Enemy** (Specified Persons) (Amendment) Order, 1945 (S.R. & O. 1945, No. 46) contains about 80 additions to the list of persons in neutral countries with whom dealings of any kind are unlawful, and a large number of deletions from the list.

**The Ministry of Food** announces the following changes in the prices of oils and fats allocated to primary wholesalers and large trade users: 1. Unrefined oils and technical animal fats during the four weeks ending March 3: sperm oil, reduction of £3 per ton if naked ex tank. 2. Refined oils and imported edible animal fats during the eight weeks ending March 31: Empire edible tallow, increased by £1 to 44s 10s. per ton; South American edible tallow, increased by £1 to 45s 15s. per ton.

## From Week to Week

### Foreign News

**The Canadian National Research Council** announces that it will undertake a census of research workers.

**The Spencer-Kellogg Company,** Buffalo, has announced plans for the construction of a \$3,000,000 solvent plant in Bellevue, Ohio, to extract oil from soya beans.

**In Mexico,** substantial petroleum deposits have been discovered near the United States frontier; the new field is considered as an elongation of the Miranda field in Texas.

**In the course of recent excavations** under the old Seville custom house, the discovery was made of 6000 tons of mercury, stocked there in the 16th century for export to America.

**According to the Soviet periodical *Trud*,** coal production in the Arctic regions has shown a ninefold increase over the pre-war level. Work is frequently carried on at temperatures of minus 40° C.

**Vanillin production in Canada** has been taken up by Howard Smith Paper Mills, Ltd., through its wholly owned subsidiary, Howard Smith Chemicals, Ltd. Output covers domestic requirements, and a certain amount is being shipped to Britain.

**Svenska Taendsticks A/B.,** Sweden's leading match concern which, some time ago, had acquired the ordinary shares of the country's second largest match company, Jönköping & Vulcan, with a nominal value of 6 million kronor, is now reported to have acquired the remaining 15 million kronor preference shares, thus carrying further the concentration of Sweden's match industry.

**A new mineral,** called brazilianite, has been discovered in Brazil. It has been found in or associated with pegmatite dikes in Minas Geraes. This conclusion was reached after a large crystal had been brought to the United States where it was analysed. Brazilianite is described as monoclinic,  $\text{Na}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ , hardness of 5 to 6, specific gravity 3.5, vitreous lustre, yellow to dark green in colour.

**A sensational increase** in the production of penicillin in the United States from 9,000,000,000 units a month in December, 1943, to the current monthly output of approximately 290,000,000,000 units, is reported by the War Production Board. This has made it possible not only to meet, but actually to exceed, anticipated military requirements by a substantial amount. In addition, sizeable quantities of penicillin are being made available for civilians.

The Brazilian Government has decreed the control of the rayon industry; an Executive Committee will control production and distribution of rayon yarn and act in an advisory capacity as regards the installation or the enlargement of plant.

**Acetylation of casein fibre** with a view to improving its qualities, has been reported on by A. E. Brown *et al.*, Eastern Regional Research Laboratories, Philadelphia, U.S.A. (*Ind. Eng. Chem.*, 1944, 36, 12, p. 1172). It was found that by treating the fibre with acetic anhydride under various conditions, acetyl contents of about 6 per cent. could be introduced without loss of wet or dry tensile strength. Fibres thus treated were superior to the untreated fibre as regards resistance to boiling solutions, and had the desirable property of a greatly decreased affinity to acid dyes, thus approaching wool more closely in respect of dye uptake.

**Members of the Chemical Institute** of Canada are to be provided at once with (1) a news bulletin, (2) a technical journal, and (3) a research journal. The news bulletin, to be known as *Chemical Institute News*, will be a new publication and will be edited by Dr. L. A. Munro of Queen's University. The first issue appeared in January. The technical journal will be *Canadian Chemistry and Process Industries*, and the research journal, sections B and F of the *Canadian Journal of Research*. All members will receive either the news bulletin or the technical journal free. The research journal will be available at preferential subscription rates.

**Application has been made** in Spain for the formation of a new company to manufacture blast-furnace cement. The company, *Antracitas Monasterio de Arbas, S.A.*, at registered in Madrid, and has its plant in León. Other new Spanish projects are a factory at Barcelona (J. R. Santomá) to turn out 600 kg. of potassium bichromate and 800 kg. of lead chromate per month; a plant at San Sebastián to produce monthly 1000 kg. of disinfectant soap, 2000 kg. of cresosol disinfectants, 4000 kg. of synthetic resin adhesives, and 20,000 of sulphate of alumina (*S. A. Española de Industrias Químicas*). *Productos Intermedios S.L.E.* have applied for permission to expand the production of their phthalic anhydride works at Barcelona to 60,000 kg. per annum.

## Forthcoming Events

**February 10. Royal Institute of Chemistry.** Department of Applied Science, St. George's Square, Sheffield, 2.30 p.m. Mr. A. V. Billingham: "Development and Industrial Application of Wetting Agents."

**February 12. The Institute of Fuel** (North-Eastern Section). Central Station Hotel, Newcastle-upon-Tyne, 5.15 p.m. Mr. J. S. F. Gard: "The Insulation of Pottery Furnaces, Kilns and Carbonising Plant."

**February 12. Royal Institute of Chemistry** (Leeds Area Section). Chemistry Lecture Theatre, Leeds University, 6.30 p.m. Dr. H. Phillips: "Wool—Some Recent Investigations of the Chemical and Physical Properties of a Natural High Polymer."

**February 13. The Chemical Engineering Group** (S.C.I.) and the **Institution of Chemical Engineers**. Rooms of the Geological Society, Burlington House, Piccadilly, W.1, 2 p.m. Mr. J. Watson Napier: "Ammonia Synthesis from Coke Oven Gas."

**February 14. British Association of Chemists.** Caxton Hall, Westminster, 6.30 p.m. Professor Harold Laski: "The Place of the Scientist in Post-War Administration."

**February 14. The Institute of Fuel**, Grosvenor Museum, Chester, 2.30 p.m. Mr. A. L. Longworth: "Thermostatic Control as an Aid to Efficiency in Fuel Utilisation."

**February 15. Chemical Society.** Society's Rooms, Burlington House, Piccadilly, W.1, 2.30 p.m. Messrs. L. C. Bateman, E. D. Hughes and C. K. Ingold: "Molecular Compounds Between Amines and Sulphur Dioxide. A Comment on Jander's Theory of Ionic Reactions in Sulphur Dioxide"; Mr. S. H. Harper: "Experiments in the Synthesis of the Pyrethrins." Part I: "Synthesis of Chrysanthemum Monocarboxylic Acid"; and Messrs. N. Barton, G. L. Buchanan, J. W. Cook, W. Graham and J. D. Loudon: "Studies on the Chemical Constitution of Colchicine."

**February 16. Leeds University, Public Lecture.** Chemistry Department, 1.20 p.m. Professor G. M. Evans: "Plastics—From Molecules to New Materials."

**February 16. Society of Chemical Industry** (South Wales Section). Royal Institution of South Wales, Swansea, 6.30 p.m. Mr. N. Swindin: "The Treatment of Spent Pickle."

**February 16. Society of Chemical Industry** (Birmingham Section). Birmingham Chamber of Commerce, 6.30 p.m. Dr. G. A. Gilbert: "Some Physico-Chemical Aspects of the Process of Dyeing."

**February 17. Institution of Factory Managers.** Kingsway Hall, Kingsway, W.C.2, 2.30 p.m. South-East (London) branch meeting.

**February 17. The Institution of Chemical Engineers** (North-Western Branch). The College of Technology, Manchester, 3 p.m. Mr. J. A. Storrow: "Fractionation of Binary Mixtures in a Wetted Wall Column."

**February 17-18. The Association of Scientific Workers**, Caxton Hall, Westminster, S.W.1. Conference: "Science in Peace." February 17, 2.15 p.m., "Science and Production." Chairman: Professor P. M. S. Blackett, F.R.S. February 18, 10 a.m., "The Future Development of Science." Chairman: Sir Robert Watson-Watt; 2.30 p.m., "Science in Everyday Life." Chairman: Professor H. Levy, F.R.S.E. Con-

ference tickets are 5s. for the three sessions, or 2s. 6d. per session, and can be obtained from: Mrs. B. Ryerson, Association of Scientific Workers, Hanover House, High Holborn, W.C.1.

**February 21. British Society for International Bibliography.** Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2, 2.30 p.m. Mr. E. M. Bennett: "The Classification of Inventions Disclosed in United Kingdom Patents Specifications"; Mr. H. Rottenburg: "Towards a Revision of the Engineering Section of the Universal Decimal Classification."

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

### Mortgages and Charges

(Note.—The Companies Consolidation Act of 1906 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.)

**KNIGHTS OIL & CHEMICAL CO., LTD.,** Birmingham. (M.S., 10/2/45.) January 17. £1000 (not ex.) charge to Lloyds Bank, Ltd.; charged on land at Church Road, Perry Barr. \*—, March 1, 1944.

**U.D.A. (PLASTICS), LTD.,** Bristol. (M., 10/2/45.) January 19. £10,000 mortgage to V. M. Millbourn & Sons, Ltd.; charged on Westbury Works, Desborough Park Road, High Wycombe.

### Satisfactions

**ANGLO ABRASIVE WORKS, LTD.,** Wembley. (M.S., 10/2/45.) Satisfaction January 20 of debenture registered July 23, 1935.

**EASTERN CHEMICAL CO., LTD.,** London, E.C. (M.S., 10/2/45.) Satisfaction January 4 of charge registered January 2, 1928, and supplemental charge registered June 8, 1932.

**LEVER BROTHERS & UNILEVER, LTD.** (formerly LEVER BROTHERS, LTD.), London, E.C., soap manufacturers. (M.S., 10/2/45.) Satisfaction January 22 of £2,288,146 4 per cent. consolidated debenture stock registered November 1, 1932, to the extent of £137,289.

### Companies Winding-Up Voluntarily

**NORTHERN CLAY PRODUCTS, LTD.** (C.W.U.V., 10/2/45.) January 18. A. D. S. Rogers, 46 Grainger Street, Newcastle-on-Tyne, appointed liquidator.

**THE PACIFIC SALT CO., LTD.** (C.W.U.V., 10/2/45.) January 25. R. D. G.

Morris and C. M. Duncan, both of 112 Cannon Street, London, E.C.1, appointed liquidators.

## New Companies Registered

**Paints and Varnishes, Ltd.** (392,845).—Private company. Capital, £5000 in 5000 £1 shares. Manufacturers of and dealers in paints, enamel, varnish, oils, glass, etc. Subscribers: L. T. Knight, D. Leaver. Registered office: 1a Southampton Row, London, W.C.1.

**Superfine Powders, Ltd.** (392,918).—Private company. Capital, £6000 in 2000 £1 preference shares and 80,000 1s. ordinary shares. Manufacturers of pulverising mills, comminutors, processors, blenders, refiners, caicimers and heat-treaters of materials, etc.; and to adopt an agreement with G. E. K. Blythe. Directors: G. Ibbotson, S. Ibbotson, J. Ibbotson (directors of Smithbrook Engineering Co., Ltd.); G. E. K. Blythe, consulting engineer; T. A. Watson, consulting chemist; C. S. Darling, consulting engineer; R. C. Wright; J. H. Martin, consulting chemist. Registered office: Russell House, 9 Adam Street, Adelphi, London, W.C.2.

## Chemical and Allied Stocks and Shares

**T**ENDENCY in stock markets has been generally steadier, with British Funds again a firm feature, although industrial shares were inclined to show small irregular movements, uncertainty as to post-war prospects still being the main influence in this section. There was again little selling, but demand generally remained on a moderate scale, although leading industrials tended to attract buyers on any decline in price.

Imperial Chemical were 38s. 9d., while the units of the Distillers Co. rallied to 108s. 3d. United Molasses were steady at 38s., and British Plaster Board better at 38s. 9d. B. Laporte kept steady at 86s. 3d., Greeff-Chemicals 5s. ordinary at 8s. 9d., Burt Boulton at 24s. 6d., and British Tar Products 5s. ordinary changed hands around 10s. 6d. British Benzol were dealt in up to 42s. and Cellon 5s. shares at 24s. W. J. Bush were 75s. Elsewhere, Turner & Newall at 85s. 6d. regained an earlier decline. Steadiness at 46s. was shown in British Aluminium, but British Oxygen reacted to 83s. 9d. De La Rue have been firm at 196s. 3d., with British Industrial Plastics 2s. shares around 6s. 1½d., and Erinoid 5s. ordinary 12s. At 17s. 3d. General Refractories have been relatively firm. Murex were 101s. 3d., Metal Box 90s. 7½d., and Triplex Glass 42s. 6d.

Thomas Baldwins were steady at 13s., and Stewarts & Lloyds 57s. 6d., while Tube

Investments rallied to £5½, but Allied Iron-founders eased to 51s. 6d., and Guest Keen to 37s. 3d. Dorman Long were 27s. 7½d., United Steel 25s., and Consett Iron 8s. 3d., movements in iron and steel shares generally not exceeding more than a few pence. Babcock & Wilcox eased to 52s. 6d. Elsewhere, Briton Ferry Steel were higher at 32s. 6d., but after 24s. Powell Duffryn were 23s. 7½d. Textile shares were inclined to attract more attention, Bradford Dyers strengthening to 26s. 10½d. on market talk of a possible increase in dividend. Bleachers were 14s. 3d., and Calico Printers 18s. 3d., but Courtaulds eased to 54s. 6d., the tendency being to await the dividend statement. British Celanese were 31s. 1½d.

Elsewhere, Associated Cement showed steadiness at 63s., but Crittall Manufacturing eased to 31s. 10½d. Amalgamated Metal strengthened to 18s., and Borax Consolidated deferred kept steady at 37s. on expectations of maintenance of the dividend. Dunlop Rubber improved to 48s., but elsewhere, Barry & Staines declined slightly to 50s. 9d., and Nairn & Greenwich to 76s. 3d. Radiation became firmer at 59s. 3d., while F. H. Lloyd were 33s. "ex" rights with the new shares 4s. premium. Parkinson & Cowan were 21s. Gas stocks have been unsettled by the unexpected "cut" in the South Met. payment, but after a sharp decline this company's stock showed a partial rally to 91½. Gas Light & Coke ordinary at 22s. 6d. regained part of an earlier small reaction. Boots Drug firmed up to 54s. Timothy Whites eased to 40s. 9d., although Beechams deferred rallied to 18s. 3d., and Sangers were 29s. 9d. British Glues & Chemicals 4s. ordinary remained steady at 9s. 3d.

There was again a good deal of activity in Lever & Unilever, which at 47s., however, failed to hold best levels recorded in the past few days. In other directions, Wall Paper Manufacturers deferred moved back slightly to 41s. 9d. Ransomes Sims & Jeffries were higher at 32s. 6d., with Ruston & Hornsby 50s. 3d. Cellon transferred at 24s. International Paint showed steadiness at 115s. awaiting the forthcoming dividend announcement, and Pinchin Johnson were little changed at 39s., while Lewis Berger became more active with dealings up to 109s. Monsanto Chemicals 5½ per cent. preference shares were 23s. Oil shares were generally inactive and movements have been small, Anglo-Iranian being 108s. 9d., "Shell" 83s. 9d., and Burmah Oil 84s. 4½d.

## British Chemical Prices

### Market Reports

**C**ONDITIONS in most sections of the London chemical market remain steady and although a moderate amount of fresh

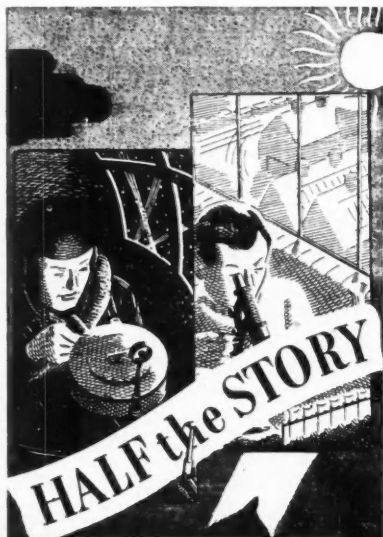
inquiry has been in evidence additions to order-books have been few. The delivery of supplies against contracts has been going forward satisfactorily. A reduction in the price of permanganate of potash by 1½d. per lb. for the B.P. grade and by 4s. 3d. per cwt. for the technical grade is reported; elsewhere values remain unchanged at recent levels and the undertone is strong. Inquiries for acid phosphate of potash have been on steady lines and the demand for solid caustic potash continues in excess of available supplies. Among the soda compounds, the demand for caustic soda and bicarbonate of soda has been well maintained, with quotations on a firm basis, while chlorate of soda remains at a good level with offers not too plentiful. Acetate of soda, Glauber salt, and salt cake are steady. Among the miscellaneous chemicals, barium carbonate is attracting fair attention and prices for glycerine are well held and both the pure and crude qualities meet with a brisk inquiry. White powdered arsenic is active and the market very firm. There has been little fresh in the general position of the coal-tar products during the week and prices remain unchanged.

**MANCHESTER.**—No important changes in the price position of heavy chemical products have been reported on the Manchester market during the past week and the undertone generally is firm in spite of odd instances where a slight recession from the highest levels reached during the war years has occurred. In the meantime, contract deliveries of the alkalis and of the general run of "heavies" have continued on steady lines, with new inquiry and actual fresh business during the week on a moderate scale. There has been no change of any consequence in the position of the tar products at this centre. The demand for pitch is almost entirely confined to the home market and has been of fair extent, while a steady trade is being done in crude tar and creosote oil. Among the light materials, benzol and toluol continue to be the brightest spots, pressure for supplies of these being well maintained.

**GLASGOW.**—During the past week, home business in the Scottish heavy chemical trade has maintained steady day-to-day transactions. Deliveries by road and rail transport are now coming back to normal. Export business is still rather restricted. Prices remain very firm with no actual changes to report.

### Price Changes

**Potassium Permanganate.**—B.P. 1s. 8½d. per lb. for 1 cwt. lots; for 3 cwt. and upwards 1s. 8d. per lb.; Technical, £7 12s. 0d. to £8 6s. 3d. according to quantity d/d.



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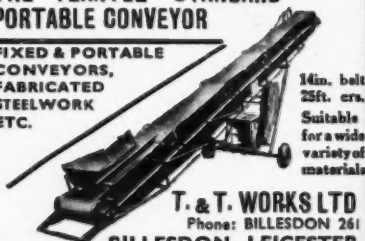
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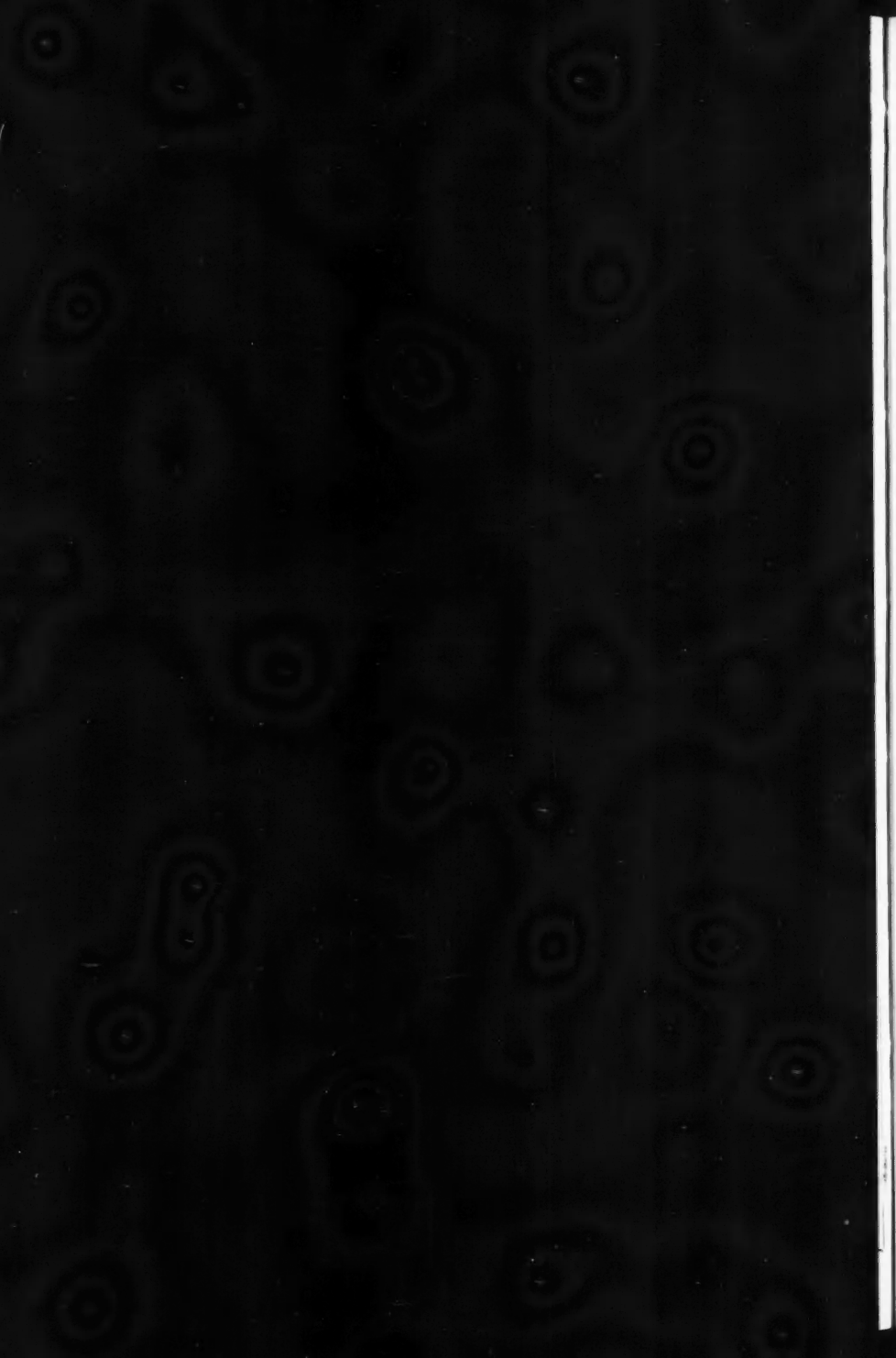
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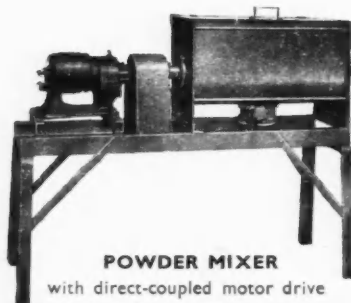
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